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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/391,473 | 09/08/1999 | NOBORU KUBO | 4930(840) | 8652 |

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| EXAMINER | |
|---|---|
| WHIPKEY, JASON T | |
| **ART UNIT** | **PAPER NUMBER** |
| 2612 | 17 |

DATE MAILED: 05/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/391,473 | KUBO ET AL. | |
| | Examiner | Art Unit | |
| | Jason T. Whipkey | 2612 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *01 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *10-17* is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 C.F.R. § 1.114*

1. A request for continued examination under 37 C.F.R. § 1.114, including the fee set forth in 37 C.F.R. § 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 C.F.R. § 1.114, and the fee set forth in 37 C.F.R. § 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 C.F.R. § 1.114. Applicant's submission filed on April 1, 2004, has been entered.

### *Response to Arguments*

2. Applicant's arguments with respect to claims 1-9 have been considered but are moot in view of the new ground of rejection.

### *Claim Rejections - 35 U.S.C. § 103*

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

evidence to the contrary. Applicant is advised of the obligation under 37 C.F.R. § 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. § 103(c) and potential 35 U.S.C. §§ 102(e), (f) or (g) prior art under 35 U.S.C. § 103(a).

5. Claims 1-3 and 7 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Suganuma (U.S. Patent No. 6,034,794) in view of Takayama (U.S. Patent No. 6,683,643).

Regarding claim 1, Suganuma discloses an imaging system with image sensor 1 ("a solid-state imaging device") with a plurality of photoelectric transducer elements (column 4, lines 26-35). Sensitivity variation corrector 132 and defective pixel corrector 133 ("a calculation section") correct sensitivity variations in the image sensor by first reading light at two different brightnesses ("varied amounts of light") to produce a characteristic curve ("output characteristics") (column 11, lines 6-18 and 31-36). The same readings are used to locate defective pixels ("a defect in the subject photoelectric transducer") (column 12, lines 49-57). An average of the levels of the pixels preceding and following any defective pixel ("a plurality of photoelectric transducers neighboring the subject phototransducer") is output in place of the signal produced by the defective pixel ("an output corresponding to a non-defective photoelectric transducer") (column 12, lines 43-63).

Suganuma is silent with regard to using only neighboring pixels of the same color to produce a correct output.

Takayama discloses an electronic camera, as shown in Figure 9. The camera corrects pixel defects by averaging the charges of eight pixels surrounding the defective pixel, using only

pixels of the same color (column 22, lines 6-11). As stated in column 22, lines 11-14, an advantage to using only pixels of the same color is that the replacement pixel will look natural, thus improving image quality. For this reason, it would have been obvious at the time of invention to have Suganuma's imaging system calculate a replacement pixel value by averaging the values of neighboring pixels of the same color.

Regarding claim 2, Suganuma teaches that line memory 151, which is contained in offset level corrector 131 stores image data output from the image sensor (column 10, lines 33-41). As shown in Figure 3, sensitivity variation corrector 132 (part of the "calculation section", as defined above) receives the output of the offset level corrector.

Regarding claim 3, it is inherent that photoelectric transducers produce an output signal corresponding to the amount of light it receives.

Regarding claim 7, Suganuma teaches that an offset level is determined by capturing a completely black subject and a completely white subject (column 10, line 64, through column 11, line 5). Since Applicant does not define the relative term "near-overflow" in the claim, any white subject could read on the claim.

6. Claims 4, 8, and 9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Temes (U.S. Patent No. 4,602,291) in view of Suganuma and further in view of Takayama.

Regarding claim 4, Temes discloses a pixel non-uniformity correction system, as shown in Figure 1. The system includes a memory comprised of offset memory 14 and gain memory 28, which store image signals in response to illumination directed to imager array 10 at light levels X1 and X2, which are detected by imager 10 at levels Y1 and Y2 (column 2, lines 15-19).

Arithmetic unit 18 forms a calculation section for determining constants M and B in the equation Y = MX + B, where M is a gain coefficient and B is an offset level (column 2, lines 4-14).

Temes is silent with regard to comparing M and B with predetermined coefficients to determine the presence or absence of a pixel defect and using neighboring pixels to correct for defective pixels.

Suganuma discloses an image sensor signal correction device, as shown in Figure 3. Defective pixel corrector 133 determines whether a particular pixel is defective by comparing a value that is calculated when image sensor 1 is exposed to white light with a predetermined threshold ("predetermined reference photoelectric coefficient $a_0$") (column 7, lines 19-27). Similarly, defective pixel corrector 133 determines whether a particular pixel is defective by comparing a calculated offset with a predetermined threshold ("predetermined reference offset output level $b_0$") (column 12, lines 49-57). An average of the levels of the pixels preceding and following any defective pixel ("a plurality of photoelectric transducers neighboring the subject phototransducer") is output in place of the signal produced by the defective pixel ("an output corresponding to a non-defective photoelectric transducer") (column 12, lines 43-63).

An advantage to differentiating between defective and non-defective pixels is that they may be corrected accordingly — e.g., non-defective pixels could be corrected with a calculated gain and offset, while defective pixels can be corrected by interpolation. For this reason, it would have been obvious at the time of invention to have Temes determine whether each pixel output is defective or satisfactory.

Suganuma is silent with regard to using only neighboring pixels of the same color to produce a correct output.

Takayama discloses an electronic camera, as shown in Figure 9. The camera corrects pixel defects by averaging the charges of eight pixels surrounding the defective pixel, using only pixels of the same color (column 22, lines 6-11). As stated in column 22, lines 11-14, an advantage to using only pixels of the same color is that the replacement pixel will look natural, thus improving image quality. For this reason, it would have been obvious at the time of invention to have Suganuma's imaging system calculate a replacement pixel value by averaging the values of neighboring pixels of the same color.

Regarding claim 8, Temes teaches that the amount of light incident upon the imager array 10 is either none (column 6, lines 11-14) or at a "predetermined level" (column 6, lines 15-24). However, Temes is silent with regard to using a level of light that places imager array 10 in a near-overflow state.

Since Temes does not specify the "predetermined level", it would have been obvious at the time of invention to use any light level, such as one that places the imager array in a near-overflow state, especially because the measurement of incident light with a large variation in brightness would produce a more accurate result.

Regarding claim 9, Temes teaches that the amount of incident light may be determined by using the equation $X = [(Y-B)/M]$ (column 2, line 27).

7. Claim 5 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Suganuma in view of Takayama and further in view of Contini (U.S. Patent No. 6,184,529).

Claim 5 may be treated like claim 1. However, Suganuma is silent with regard to using a defocused optical system for calibration.

Contini discloses a uniformity correction apparatus for an imaging system. As stated in column 2, lines 42-48, an advantage to using a defocused optical device when calibrating an imaging device is that a uniform photon flux may be cast upon the imaging device without needing a perfectly uniform illumination device. For this reason, it would have been obvious at the time of invention to have Suganuma include a defocused optical system, such as the one described by Contini.

8. Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Temes in view of Suganuma and further in view of Takayama and Contini.

Claim 6 may be treated like claim 4. However, Temes is silent with regard to using a defocused optical system for calibration.

Contini discloses a uniformity correction apparatus for an imaging system. As stated in column 2, lines 42-48, an advantage to using a defocused optical device when calibrating an imaging device is that a uniform photon flux may be cast upon the imaging device without needing a perfectly uniform illumination device. For this reason, it would have been obvious at the time of invention to have Temes include a defocused optical system, such as the one described by Contini.

***Allowable Subject Matter***

9. Claims 10-17 are allowed.

Regarding claims 10 and 11, no prior art could be located that teaches or fairly suggests a pixel defect detector that sets a coefficient in the given equation to a median of the outputs of a specific set of photoelectric transducers.

Regarding claims 12 and 13, no prior art could be located that teaches or fairly suggests an image sensor calibration system that detects defective pixels using the given equations.

***Conclusion***

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason T. Whipkey, whose telephone number is (703) 305-1819. The examiner can normally be reached Monday through Friday from 8:30 A.M. to 6:00 P.M. eastern daylight time, alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wendy R. Garber, can be reached on (703) 305-4929. The fax phone number for the organization where this application is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JTW
April 20, 2004

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